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Confirmatory factor structure and psychometric properties of the Multidimensional Peer Victimization Scale

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Abstract

The Multidimensional Peer Victimization Scale (MPVS; Mynard & Joseph, 2000) is a 16-item self-report scale that captures peer victimization across four dimensions: physical victimization, verbal victimization, social manipulation, and attacks on property. Performance of the scale has not been evaluated among older adolescents. We examined the factor structure, internal consistency reliability, and performance of the scale in two separate epidemiological U.S. samples representing different age groups: 9–14 year olds (N=610) and 15–17 year olds (N=524). The four-factor structure of the scale was affirmed in both samples, however; there was not metric invariance by gender in the younger age group. The scale and its subscales were found to have good internal consistency. Expected relationships between the MPVS and measures of irritability, anxiety, and depression were affirmed. Results support continued use of the MPVS among child and adolescent samples.

Keywords

peer victimization; confirmatory factor analysis; reliability; measurement invariance

Introduction

Between 20–40% of children experience peer victimization at least once during their school careers (Shetgiri, Lin & Flores, 2013). Abundant evidence has accumulated indicating that peer victimization results in negative psychological sequelae including internalizing and externalizing outcomes (see Arseneault, Bowes, & Shakoor, 2010 for a review). Given the

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Compliance with Ethical Standards

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high prevalence of peer victimization and its known deleterious effects on mental health, attention has been increasingly placed on the measurement of the phenomenon to capture its breadth and depth. Previous work by Betts, Houston, and Steer (2015) reviewed different approaches to measuring victimization (i.e., observation, parent/teacher/peer-report, and self-report) and noted that self-report measurement avoids potential underestimation of victims' experiences that can occur particularly with more covert types of victimization which are less visible to parents, teachers, peers, and outside observers (Demaray, Malecki, Secord, & Lyell, 2013). Furthermore, other-report methods do not take into account the subjective nature of victimization. The self-perception of victimization, rather than reputation among peers or "objective" victimization, may be what puts one at risk for the negative sequelae of peer victimization (Graham & Juvonen, 1998; Gromann, Goossens, Olthof, Pronk, & Krabbendam, 2013). Self-reported accounts, therefore, may be more relevant assessments of peer victimization.

One important differentiating characteristic of self-report instruments is how they capture *types* of victimization. Summaries of self-report instruments to assess peer victimization are available elsewhere (e.g., Betts et al., 2015; Crothers & Levinson, 2004). While many assessments aim to capture at least some mixture of physical and non-physical victimization, others focus exclusively on one type of victimization (e.g., Social Bullying Involvement Scale; Fitzpatrick & Bussey, 2011). The Multidimensional Peer Victimization Scale (MPVS; Mynard & Joseph, 2000) uniquely contains subscales that encompass four different types of peer victimization: physical victimization, verbal victimization, social manipulation, and attacks on property. This latter category, in particular, is understudied in the literature (Crothers & Levinson, 2004; Betts et al., 2015). As such, the MPVS is ideally suited for research that aims to disentangle the effects of varying types of peer victimization.

The MPVS was developed for use among children aged 11-16 in England, and its factor structure was affirmed in a sample of 7-12 year olds in Nigeria (Balogun & Olapegba, 2007) using principal components analysis. Betts et al. (2015) conducted a confirmatory analysis on 11-15 year olds in the UK and affirmed the factor structure in a mixed-gender sample. However, there were significant differences in the relative strength of item factor loadings (i.e., measurement non-invariance) by gender. Additionally, they assessed convergent validity using a self-esteem scale and found a significant negative association between peer victimization and self-esteem.

Despite this valuable previous work, several questions about the MPVS remain unanswered. Of note, the scale has been tested exclusively with children and younger adolescents. How the scale performs among older adolescents remains unexplored. Researchers who aim to use the MPVS to assess developmental trends in peer victimization and among types of peer victimization must first be assured that the scale is applicable to multiple age groups. Theoretical work (Björkqvist, Lagerspetz, & Kaukiainen, 1992) and age-sensitive analyses (e.g., Rivers & Smith, 1994) suggest the nature of peer victimization changes across development, such that more overt types of victimization are replaced by—or are at least accompanied by—attacks that are subtler in nature. Hence, it would be useful to analyze the properties of the MPVS for future assessment of different types of peer victimization that occur throughout development. Furthermore, although recent trajectory research suggests

grade-related declines in peer victimization throughout schooling (Ladd, Ettekal, & Kochenderfer-Ladd, 2017), mixture modeling efforts have identified classes of “moderate” or “high chronic victims” (Boivin, Petitclerc, Feng, & Barker, 2010; Goldbaum, Craig, Pepler, & Connolly, 2003; Sumter, Baumgartner, Valkenburg, & Peter, 2012) who continue to experience peer victimization as they age despite lower overall normative rates. The persistence of peer victimization across all ages underscores the need to assess psychometric properties of peer victimization measurement tools for use across developmental timepoints. As such, the aim of this paper was to conduct confirmatory factor analysis and assess performance of the MPVS in two separate samples representing different age groups (i.e., children and adolescents).

To assess validity of the peer victimization construct measured by the MPVS, we identified a set of constructs that we expected to correlate (either positively or negatively, as described next) to peer victimization. Given that peer victimization is one type of dysfunction with peers, we anticipated a significant positive association between MPVS and a measure of difficulty with peer relationships. The relationship between anxiety and peer victimization appears to be bidirectional (Silberg et al., 2016); the experience of peer victimization may result in symptoms of anxiety (Arseneault et al., 2010) while displaying symptoms of anxiety may elicit maltreatment from peers (Cook, Williams, Guerra, Kim, & Sadek, 2010). Therefore, it was expected that there would be a significant positive correlation between measures of anxiety and MPVS scores. As with anxiety, there is a possible bidirectional relationship between peer victimization and depression symptoms, such that the experience of peer victimization results in depression symptoms while display of symptoms of depression (e.g., withdrawal, crying) may elicit victimization from peers (Cook et al., 2010). Therefore, it was thought that scores on a depression measure would be significantly positively correlated with scores on the MPVS. Although we are unaware of studies that examine the relationship of irritability *per se* and peer victimization, peer victimization could cause one to become irritable, while displays of irritability (e.g., anger) may elicit peer victimization. Hence, a significant positive correlation between irritability and MPVS scores was expected.

Because extraversion is associated with sociability (Plomin, 1976), either a null or a negative correlation between extraversion scores the MPVS was expected.

We anticipated that any measurement invariance by gender identified in the child sample (and consistent with that found by Betts et al., 2015) would be exacerbated in the adolescent sample because of the gender intensification hypothesis, which suggests increased pressure during adolescence to conform to culturally-sanctioned gender roles (Hill and Lynch, 1983). That is, differences between boys and girls in their understanding and interpretation of peer victimization may become stronger with age. As a consequence of this differentiation, we suspected the fit of the four-factor model of the MPVS may be worse in the adolescent sample as compared to the child sample.

Method

Participants

Participants in the present analysis were part of two related studies; The Twin Study of Negative Valence Emotional Constructs (hereafter referred to as the Juvenile Anxiety Study or JAS; Carney et al., 2016) and Genetic Contributions of Negative Valence Systems to Internalizing Pathways study (hereafter referred to as the Adolescent/Young Adult Twin Study or AYATS). Both JAS and AYATS recruited twin pairs through the Mid-Atlantic Twin Registry (MATR), a database of twins and their family members who have expressed interest in research participation that is housed at [Institution name redacted] (Lilley & Silberg, 2013). An unselected sample was recruited from MATR according to registry protocols to ensure generalizability of genetic and environmental estimates and to reproduce an epidemiological distribution of psychopathology. Detailed descriptions of participant recruitment processes, power, and demographics for the parent studies are located elsewhere (Carney et al., 2016 for JAS; Cecilione et al., 2018 for AYATS). The analytic sample for the present investigation was comprised of 292 twin pairs and 26 half pairs ($N=610$, $M_{\text{age}}=11.40$ years [$SD=1.52$], 52.8% female, 100% Caucasian) from JAS and 256 twin pairs and 12 half pairs ($N=524$, $M_{\text{age}}=16.04$ years [$SD=.65$], 57.5% female, 87.0% Caucasian, 7.9% Black, and 5.2% Hispanic) from AYATS who completed the MPVS at the first study assessment, as described below. The AYATS sample was limited to participants under age 18 to exclude college aged emerging adults and to ensure generalizability of results to mid- to late adolescents. Written informed consent was obtained from adults (parents or guardians of minors) and assent was obtained from minors whose parents or guardians provided written consent. The [Institution name redacted] Institutional Review Board reviewed and approved of all study procedures and materials. The study procedures were performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

Procedures

During the first assessment for each of these studies, participants were asked to complete a self-report questionnaire in the Research Electronic Data Capture (REDCap) system hosted at [Institution Name Redacted] (Harris et al., 2009) that included the MPVS (Mynard & Joseph, 2000). The MPVS was added after the start of JAS and was therefore not completed by all participants; 610 JAS participants completed the MPVS during their first visit. Technical difficulties prevented a portion of AYATS participants from completing all items of the MPVS and these partial scores were not included in the analysis. 524 AYATS participants aged 15-17 completed the MPVS. Participants in both studies also completed the Short Mood and Feelings Questionnaire (SMFQ) (Angold et al., 1995), the Affective Reactivity Index (ARI) (Stringaris et al., 2012), and versions of the neuroticism and extraversion subscales of the Eysenck Personality Questionnaire (EPQ)—Junior for the child sample (Eysenck, 1975) and adult short form for adolescent sample (Eysenck, Eysenck, & Barrett, 1985). In addition, younger participants completed the Screen for Child Anxiety Related Disorders (SCARED; Birmaher et al., 1997) and adolescents completed the Index of Peer Relations (IPR) (Hudson, Nurius, Daley, & Newsome, 1993).

Measures

The Multidimensional Peer Victimization Scale—The Multidimensional Peer Victimization Scale (MPVS; Mynard & Joseph, 2000) is a 16-item questionnaire that asks “how often during the last school year has another pupil done these things to you?”. Response options are 0 = “Not at all”, 1 = “Once”, and 2 = “More than once”. Four factors (consisting of four items each) comprise the MPVS to address multiple dimensions of victimization: physical victimization, verbal victimization, social manipulation, and attacks on property. The items of the MPVS are provided as an appendix.

Index of Peer Relations—The Index of Peer Relations (IPR) is a 25-item scale that assesses the extent to which a respondent has problems with peers (Hudson et al., 1993). Statements about the respondent’s relationship with his or her peer group are endorsed by using a 7-point Likert scale ranging from “None of the time” to “All of the time”. Select items are reverse-coded, such that higher scores indicate greater difficulty with the peer group. Reliability and validity of the scale have been established (Hudson, 1990). The internal consistency reliability of the IPR in the adolescent sample was $\alpha = .95$.

Screen for Child Anxiety Related Disorders—The Screen for Childhood Anxiety Related Disorders (SCARED; Birmaher et al., 1997) is a 41-item scale to screen for childhood anxiety disorders, including generalized anxiety disorder, separation anxiety disorder, panic disorder, and social phobia. Statements about feelings, fears, and worries are assessed with response options: 0 = “Not true or hardly ever true”, 1 = “Somewhat true or sometimes true”, or 2 = “Very true or often true”. Summed scores greater than or equal to 25 may indicate the presence of an anxiety disorder. Previous studies have found the scale to be reliable and valid (Birmaher 1997; Birmaher et al. 1999). Internal consistency reliability for the SCARED in the child sample was $\alpha = .91$.

Short Mood and Feelings Questionnaire—The Short Mood and Feelings Questionnaire (SMFQ) is 13-item scale used to measure symptoms of depression among children and adolescents (Angold et al., 1995). Each item of the scale is rated on a 3-point Likert scale: 0 = “True”, 1 = “Sometimes” and 2 = “Not True”. The validity of this scale to assess depressive symptoms has been demonstrated in a clinical sample of children (Angold et al., 1995), a sample of detained adolescents (Kuo, Stoep Vander, & Steward, 2005), a community sample of children and adolescents (Thapar & McGuffin, 1998), and a school-based sample of adolescents (Rhew et al., 2010). The internal consistency reliability of the scale in the child sample was $\alpha = .83$ and in the adolescent sample was $\alpha = .84$.

Affective Reactivity Index—The Affective Reactivity Index (ARI) is a 7-item unidimensional scale used to measure irritability (Stringaris et al., 2012). Items ask the respondent to assess how well each describes his or her feelings or behavior in the past six months. Items are rated on a 3-point Likert scale corresponding to the responses “Not true”, “Somewhat True”, and “Certainly True”. The total score is the sum of the first six items, yielding possible scores of 0-12. The 7th item of the scale assesses irritability-related impairment and is scored separately. The ARI has been found to be reliable and valid in samples of children with and at risk for bipolar disorder, children with severe mood

dysregulation, and typically developing children (Stringaris et al., 2012). The internal consistency reliability for ARI in the child and adolescent samples was $\alpha = .82$ and $\alpha = .86$, respectively.

Eysenck Personality Questionnaire, Extraversion Subscale—Adolescents answered 8 items from the short form Eysenck Personality Questionnaire (EPQ-SF) to assess extraversion (8 items) (Eysenck, Eysenck, & Barrett, 1985). Respondents were asked to answer “yes” (1)/“no” (0) to questions about their personality. Internal consistency reliability for the extraversion subscale was $\alpha = .80$.

Children answered 23 items from the Junior Eysenck Personality Questionnaire (JEPQ) to measure extraversion. Respondents were asked a series of “yes” (1)/“no” (0) questions about their personality. Select items were reverse-coded and higher scores indicate higher levels of extraversion. Internal consistency reliability for the extraversion subscale in JAS was $\alpha = .64$.

Analytic Strategy

Because previous work suggests that the nature of peer victimization changes over the course of development (Rivers & Smith, 1994), psychometric properties of the MPVS were examined in the child (JAS) and adolescent (AYATS) samples separately. First, we computed descriptive statistics (i.e., mean and standard deviation) of the total score of the MPVS and its four factors (i.e., physical victimization, verbal victimization, social manipulation, and attacks on property) in each sample separately. The majority of children and adolescents did not experience peer victimization. The distribution of the MPVS in both samples was, therefore, positively skewed, thus violating the assumption of normality required for parametric tests of mean differences. To compare mean levels of victimization for each factor of the MPVS across age groups accounting for the non-normality of the data, we conducted Wilcoxon Rank Sum Tests. We then conducted one-way analysis of variance (ANOVA), a test robust to violations of normality, to examine differences in means by gender. SAS 9.4 (SAS Institute, Cary NC) was used to calculate descriptive statistics and to test for mean differences by study and by gender.

Next, we conducted confirmatory factor analyses (CFA) for ordered categorical (ordinal) data in Mplus 8 (Muthén & Muthén, 1998–2015) in the child and adolescent samples separately. This analysis is appropriate in later stages of scale development and tests of psychometric properties when the number of factors has been previously established (e.g., Balogun & Olapegba, 2007; Betts et al., 2015). We, therefore, assessed the fit of the data to the aforementioned four-factor structure of the MPVS, using chi square tests and model fit indices (specifically, CFI, TLI, and RMSEA). Hu & Bentler (1999) suggest that CFI and TLI scores greater than or equal to .95 demonstrate good fit. Cut-offs for RMSEA recommended by Browne & Cudeck (1993) are less than or equal to .05 for close fit, .05–.08 for reasonable fit, and greater than or equal to .10 for poor fit. Additionally, because prior research suggests that the scale may perform differently in boys and girls (Betts et al., 2015), we tested measurement invariance by gender using a multiple group CFA in each sample separately. Configural invariance ensures that the basic model structure, with no parameter constraints,

is the same between groups and suggests that the different groups of respondents being tested conceptualize the constructs of the scale in the same way (Cheung & Rensvold, 2000; Marsh, 1994; Riordan & Vandenburg, 1994).

Cronbach's alphas for internal consistency reliability were calculated for the total and factor sums of the MPVS using SAS 9.4 (SAS Institute, Cary NC). Cronbach's alpha ranges from 0-1, with higher numbers indicating that items within the scale or subscale are highly related to one another and, therefore, measure the same concept (Tavakol & Dennick, 2011).

Spearman's correlation coefficient, accommodating the non-normal distribution of the MPVS, was calculated in SAS 9.4 (SAS Institute, Cary NC) to assess theoretical relationships between MPVS and its subscales and the aforementioned measures of peer relations, anxiety, depression, irritability, and extraversion. We used an alpha of .05 to determine whether the correlation between the two scales was significantly different from zero, and the sign of the coefficient to determine whether the correlation was positive or negative.

Results

Descriptive Statistics

Comparison of mean levels of overall victimization across studies, as measured by the total MPVS score, showed significantly lower levels of victimization in the older age group ($M=6.31$, $SD=6.52$) as compared to the younger one ($M=8.27$, $SD=7.06$; $Z=-5.25$, $p<.0001$). Examination of subscales revealed significant differences in mean levels of physical victimization ($Z=-7.95$, $p<.0001$), social manipulation ($Z=-5.01$, $p<.0001$), and attacks on property ($Z=-9.34$, $p<.0001$) between the two studies, with the older age group demonstrating lower means than the younger age group. While the mean level of verbal victimization was higher in the older age group ($M=3.03$, $SD=2.82$), this was not significantly different from that of the younger age group ($M=2.64$, $SD=2.47$).

In both age groups, boys had significantly higher mean levels of physical victimization and verbal victimization than girls (see Table 1). Whereas boys also had significantly higher mean levels of property victimization in the younger age group, this was not the case in the adolescent sample, in which there was no significant difference in property victimization by gender. Social manipulation was higher among girls in the adolescent sample; however, there were no sex differences in social manipulation in the younger age group.

Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) showed that the MPVS performed excellently in both age groups examined separately (see Table 2). Both studies have a significant X^2 test ($p<.0001$), but this is not uncommon with larger sample sizes (Schumacker & Lomax, 1996). CFI, TLI, and RMSEA goodness-of-fit statistics suggest a slightly better fit for the younger sample as compared to the older sample. The standardized loadings (represented by arrows extending to the right from each factor to the abbreviated item) for each factor are provided for each study in Figures 1 and 2. All factor loadings in both studies were significant at $p<.001$. In the child sample, the factor loadings ranged from a loading of .65 for "Swore at me"

on verbal victimization to .91 for “Punched me” on physical victimization. In the adolescent sample, the factor loadings ranged from loadings of .78 for “Beat me up” on physical victimization and for “Stole something from me” on attacks on property to .96 for “Hurt me physically in some way” on physical victimization.

The CFAs conducted for younger boys and girls separately showed excellent fit for both groups, and multiple group CFA confirmed configural invariance between these groups, but not metric invariance (see Table 3), suggesting that factor loadings are not the same between groups. Lack of metric invariance by gender in this age group precluded tests of scalar invariance by gender in this sample and between the child and adolescent samples (Bollen, 1989). The CFAs conducted separately for adolescent boys and girls also showed excellent fit for both genders. Furthermore, multiple group CFA confirmed configural, metric, and scalar invariance (see Table 3).

Reliability

Cronbach’s α for the total MPVS score in the child sample was .78, which is an indication of good internal consistency reliability. Internal consistency reliability was also high in each of the subscales: $\alpha=.89$ for physical victimization, $\alpha=.83$ for verbal victimization, $\alpha=.78$ for social manipulation, and $\alpha=.76$ for attacks on property. Cronbach’s α for the total MPVS in the adolescent sample, was considerably higher at .89. The subscales demonstrated good internal consistency reliability: $\alpha=.82$ for physical victimization, $\alpha=.83$ for verbal victimization, $\alpha=.82$ for social manipulation, and $\alpha=.67$ for attacks on property.

Correlations with Other Scales

As shown in Table 4, we found the expected positive relationships between the MPVS and the IPR (adolescents only), SCARED (children only), SMFQ (children and adolescents) and ARI (children and adolescents). Among children, we found the expected null or negative correlations between the MPVS and its subscales and the extraversion subscale of the EPQ. Among adolescents, we found no significant correlations between extraversion and subscale scores for physical victimization, verbal victimization, and property victimization. There were, however, significant, positive associations between extraversion and total MPVS score and the social manipulation subscale, albeit small ($r=.09$, $p<.05$ and $r=.11$, $p<.05$ respectively).

Discussion

We examined performance of the MPVS in two samples representing different age groups: one study encompassing ages 9-14, and the other encompassing ages 15-17. While some psychometric properties of the MPVS have been explored in previous research with children and pre-adolescents (Balogun & Olapegba, 2007; Betts et al., 2015), this is the first investigation to examine properties of the scale in individuals from mid-late-adolescence. Mixture modeling (e.g., Boivin et al., 2010; Goldbaum, et al., 2003; Sumter, et al., 2012) indicates that subgroups of adolescents continue to be victimized by their peers despite overall normative declines in peer victimization, underscoring the need to assess peer victimization across developmental timepoints.

On the whole, the younger age group reported more victimization than the older age group (with the exception of verbal victimization). This is consistent with longitudinal research, which shows declines in peer victimization across years of schooling (Ladd et al., 2017). Unlike the other types of peer victimization, verbal victimization was higher, though not significantly so, in the older age group. This perhaps represents an age-related shift in norms regarding “acceptable” forms of peer victimization. While overt physical forms of victimization become less common as children age (Björkqvist, et al., 1992), verbal insults continue to be a salient form of victimization. The lack of difference between older and younger groups in mean levels of social manipulation is interesting, given that social manipulation is thought to require more social sophistication than is typical among younger children (Björkqvist et al., 1992).

In the child sample, comparisons by gender show that boys experienced more physical victimization, verbal victimization, attacks on property, and overall victimization than girls; however, there was no difference in levels of social manipulation between boys and girls. These findings are consistent with a meta-analysis by Casper & Card (2017), which found that while physical victimization is more common among boys, rates of relational victimization (i.e., social manipulation) do not differ by gender. In contrast, we found that adolescent girls reported more social victimization than adolescent boys, whereas the pattern was reversed for physical and verbal victimization. Overall victimization did not differ by gender among adolescents.

CFA results indicated excellent performance and configural invariance by gender the child sample. This suggests that the MPVS reproduces the same pattern of factors for boys and girls in younger age groups. Lack of metric invariance precluded formal testing of stronger forms of invariance (i.e., scalar) in this sample. Post hoc analysis (data not shown) found the factor loading for the physical victimization item “Beat me up,” to be much greater for girls than for boys when compared with gender differences for other items. Betts and colleagues (2015) also found factor loading differences by gender for the physical victimization factor. Qualitative research may be informative in investigating how and why this and other loadings might differ in the younger age group.

CFA results for the adolescent sample also indicated excellent performance of the 4-factor model. Furthermore, configural, metric, and scalar measurement invariance held across genders in the adolescent, indicating that the structure of factors for the MPVS is the same for boys and girls (i.e., configural invariance), that the factor loadings across groups are statistically equivalent (i.e., metric invariance), and that the thresholds of the scale are invariant between the two genders (Bowen & Masa, 2015). The finding of measurement invariance by gender was counter to our expectations based on the gender intensification process (Hill & Lynch, 1983) and provides reassurance that the MPVS may be used in mixed gender samples of adolescents.

We found the MPVS—total scale and subscales—to be highly reliable in terms of internal consistency reliability in both samples. Additionally, we found expected correlations with measures of peer relations, anxiety, depression, and irritability, and extraversion. While there is some research on the relationship between personality traits and peer victimization (e.g.,

Jensen-Campbell, 2002; Mynard & Joseph, 1997), *type* of victimization is often not taken into account. The finding of a significant correlation between extraversion and social manipulation in adolescents is consistent with the work of Tackett and colleagues (2014) which suggests a relationship between sociability and involvement in socially sophisticated forms of aggression (i.e., social manipulation). Our finding of a small negative correlation between extraversion and physical victimization in the child sample suggests that the personality trait may be protective against less sophisticated social behaviors, particularly at younger ages.

Betts et al. (2015) proposed a revision to the Multidimensional Peer Victimization Scale (MPVS-R), containing a fifth subscale intending to capture electronic victimization (i.e., cyberbullying) in isolation. While the specification of electronic victimization represents an important advance in bullying measurement, particularly as phone and web-based communications have increasingly become tools for peer victimization (Wang et al., 2009), we note that the MPVS as it was initially conceptualized does not *exclude* victimization that occurs through electronic means. For example, name-calling (item 1 of the MPVS) may occur in a face-to-face context or via phone or web-based communication. As such, the MPVS in its original conception remains worthy of use, particularly in light of findings regarding its performance and reliability.

Although our statistical analyses took into account the non-independence of data from twins, twin pairs may not be representative of the general child and adolescent population with regard to peer victimization. Some evidence (e.g., Lamarche, Brendgen, Boivin, Vitaro, Péro, & Dionne, 2006) suggests that the presence of a prosocial co-twin (as with a prosocial friend or non-twin sibling) may reduce the likelihood of being targeted for peer victimization, particularly for individuals with reactive aggression tendencies. On the other hand, research also indicates no differences between twin and non-twin samples in behavior problems and personality characteristics (Pulkkinen, Vaalamo, Hietala, Kaprio, & Rose, 2003), suggesting that the psychometric properties of the MPVS should not differ between twin and singleton samples. Additionally, the JAS and AYATS samples were each restricted in racial and ethnic diversity to ensure homogeneity required for genetic analysis. Further research on the performance of the MPVS in more diverse samples is needed.

Despite these limitations, this investigation represents a significant contribution. First, we tested performance of the MPVS against a series of measures with established psychometric properties. Second, the use of the same measurements in a sample of children and a sample of adolescents allowed for tests of performance of the MPVS in a broader age range than has been previously possible, which is essential for investigators who wish to use the MPVS to study developmental trends in types of peer victimization. In sum, our findings support continued use of the MPVS in mixed gender samples in childhood and adolescence.

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Appendix

Multidimensional Peer Victimization Scale (Mynard & Joseph, 2000).

Below is a list of things that some children do to other children. How often during the last school year has another pupil done these things to you?

1. **Called** me **names**
2. Tried to get me into **trouble** with my friends
3. **Took** something of mine without permission
4. Made fun of me because of my **appearance**
5. Made fun of me for some **reason**
6. **Punched** me
7. **Kicked** me
8. **Hurt** me physically in some way
9. **Beat** me up
10. Tried to **break** something of mine
11. Tried to make my friends turn **against** me
12. **Stole** something from me
13. **Refused** to talk to me
14. Made others **not talk** to me
15. Deliberately **damaged** some property of mine
16. **Swore** at me

Response options: 0=Not at all, 1=Once, 2=More than once

Note: Bold denotes variable names used in confirmatory factor analysis (see Figures 1 and 2)

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Figure 1.
Standardized parameter estimates for 4-factor confirmatory factor analysis of the
Multidimensional Peer Victimization Scale in JAS (N=610)
Note: See Appendix for complete scale items.

Figure 2.

Standardized parameter estimates for 4-factor confirmatory factor analysis of the Multidimensional Peer Victimization Scale in AYATS (N=629)

Note: See Appendix for complete scale items.

Table 1

Comparison of mean Multidimensional Peer Victimization Scale subscale and total scores by gender in JAS and AYATS

	Mean (SD)		ANOVA F
JAS			
	Boys	Girls	N= 610
	N=288	N=322	
Physical victimization	1.68 (2.36)	.85 (1.67)	25.98***
Verbal victimization	3.13 (2.44)	2.23 (2.43)	20.57***
Social manipulation	2.12 (2.24)	2.12 (2.26)	0.00
Attacks on property	2.54 (2.33)	2.07 (2.12)	6.93**
MPVS total	9.47 (7.37)	7.27 (6.34)	15.07***
AYATS			
	Boys	Girls	N=524
	N=226	N=298	
Physical victimization	.69 (1.63)	.34 (1.16)	8.21**
Verbal victimization	3.50(2.98)	2.67 (2.65)	11.08***
Social manipulation	1.38 (2.07)	1.79 (2.38)	4.32*
Attacks on property	1.32 (1.75)	1.06 (1.60)	3.21
MPVS total	6.89 (6.79)	5.87(6.29)	2.66

SD=Standard deviation

*
 $p < .05$

**
 $p < .01$

 $p < .0001$

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Table 2

Goodness-of-fit statistics for 4-factor confirmatory factor analysis of the Multidimensional Peer Victimization scale in JAS and AYATS

Study	χ^2	df	p	CFI	TLI	RMSEA (95% CI)
JAS	217.05	98	<.0001	.98	.98	.05 (.04, .05)
AYATS	270.40	98	<.0001	.98	.92	.06 (.05, .07)

df=degrees of freedom; CFI=Comparative Fit Index; TLI=Tucker-Lewis Index; RMSEA=Root Mean Square Error of Approximation; CI=Confidence interval

Table 3

Goodness-of-fit statistics for confirmatory factor analysis of the Multidimensional Peer Victimization scale in JAS and AYATS by gender

Study	χ^2	df	p	CFI	TLI	RMSEA (95% CI)
JAS						
Boys	143.27	98	<.0001	.99	.98	.04(.03-.05)
Girls	147.80	98	<.0001	.99	.98	.04(.03-.05)
Configural invariance model	329.34	196	<.0001	.98	.98	.05(.04-.06)
Metric invariance model *	362.63	208	<.0001	.98	.98	.05(.04-.06)
AYATS						
Boys	171.56	98	<.0001	.98	.98	.06(.04-.07)
Girls	171.44	98	<.0001	.98	.98	.05(.04-.06)
Configural invariance model	342.99	196	<.0001	.98	.98	.05 (.04-.06)
Metric invariance model	357.82	208	<.0001	.98	.98	.05(.04-.06)
Scalar invariance model	367.74	220	<.0001	.98	.98	.05(.04-.06)

df=degrees of freedom; CFI=Comparative Fit Index; TLI=Tucker-Lewis Index; RMSEA=Root Mean Square Error of Approximation; CI=Confidence interval;

* p-value of comparison between configural and metric invariance models <.01

Table 4
Correlations between the Multidimensional Peer Victimization Scale and subscales and other validated measures

Scale	Spearman's rho									
	IPR		SCARED		SMFQ		ARI		EPQ extraversion	
	AYATS	JAS	AYATS	JAS	AYATS	JAS	AYATS	JAS	AYATS	JAS
Physical victimization	.12**	.16**			.32**	.20**	.21**	.22**	-.12**	.04
Verbal victimization	.30**	.24**			.34**	.31**	.29**	.29**	-.05	.05
Social manipulation	.25**	.31**			.33**	.28**	.25**	.27**	-.05	.11*
Attacks on property	.26**	.23**			.27**	.24**	.22**	.19**	-.05	.08
MPVS total	.32**	.31**			.40**	.34**	.31**	.32**	-.08	.09*

ARI=Affective Reactivity Index; SCARED=Screen for Child Anxiety Related Disorders; SMFQ=Short Mood and Feelings Questionnaire; EPQ=Eysenck Personality Questionnaire

* $p < .05$

** $p < .01$